

Notice of Allowability

Application No.

09/163,402

Examiner

Leon Scott, Jr.

Applicant(s)

SANO ET AL.

Art Unit

2828

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Exm's Amend't filed 5/24/04.
2. ☒ The allowed claim(s) is/are 1,2,4-8,10-15,17-29 and 66-92.
3. ☒ The drawings filed on 30 September 1998 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date 5/24/04.
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

Leon Scott, Jr.
Primary Examiner
Art Unit: 2828



EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Jack S. Cubert reg. no. 24,245 on 5/24/04.

The claims have been amended to read as follows:

"1. (Currently Amended) A gas laser device, comprising: a chamber for confining a laser gas therein; a discharging electrodes for exciting the laser gas through electrical discharging; a total reflection mirror for totally reflecting laser light produced by the electrical discharging from said discharging electrode; an output half-mirror for reflecting the laser light and for outputting a portion of the laser light amplified between said total reflection mirror and said output half-mirror spaced for resonant reflection of the laser light; a blower rotatable in the chamber for recirculating the laser gas within said chamber through an electrical discharging region of said discharging electrodes and; and operating means including first means for operating the blower at a first rotational speed responsive to the electrical discharging of the discharge electrodes in an operational state in which the laser gas is excited by the electrical discharging from said discharge electrodes to output

the laser light and second means for operating the blower at a second lower speed and reduced lower load in a stand-by state in which laser gas is not excited by the electrical discharging from said discharging electrodes for outputting the laser light.

2. (Currently Amended) A gas laser device according to Claim 1, wherein said second means operates rotation of said blower when said gas laser device is in the stand-by state by stopping the blower.

3. (Previously Cancelled) 4. (Previously Presented) A gas laser device according to Claim 2, wherein said blower has a blowing blade rotatably supported within said chamber.

5. (Previously Presented) A gas laser device according to Claim 1, wherein said laser device comprises a noble gas halide excimer laser.

6. (Previously Presented) A gas laser device according to Claim 5, wherein said noble gas halide excimer laser comprises an XeCl excimer laser.

7. (Previously Presented) A gas laser device according to Claim 1, further comprising an exposure apparatus for exposing a substrate to the laser light supplied from said gas laser device.

8. (Currently Amended) A gas laser device according to Claim 7, wherein said second means operates rotation of said blower when said gas laser device is in the stand-by state by stopping the blower.

9. (Previously Cancelled)

10. (Previously Presented) A gas laser device according to Claim 8, wherein said blower has a blowing blade rotatably supported within said chamber.

11. (Previously Presented) A gas laser device according to Claim 8, wherein said laser device comprises a noble gas halide excimer laser.

12. (Previously Presented) A gas laser device according to Claim 11, wherein said noble gas halide excimer laser comprises an XeCl excimer laser.

13. (Currently Amended) In an exposure apparatus having a main assembly for exposing a substrate to a laser light from a laser source the laser source comprising:

i (i) a chamber for-confining a laser gas therein, (ii) discharging electrodes for exciting the laser gas through electrical discharging, (iii) a total reflection mirror for totally reflecting laser light produced by the electrical discharging from said discharging electrodes, (iv) an output half mirror for reflecting the laser light and for outputting a portion of the laser light reflected between said total reflection mirror and said output half-mirror spaced for resonant reflection of the laser light, and (v) a blower rotatable in the chamber for recirculating the laser gas within said chamber through an electrical discharging region of said discharging electrodes; and operating means including first means for operating the blower at a first rotational speed responsive to the electrical discharging of the discharge electrodes in an exposure operating state in which the laser gas is excited by the electrical discharging from said discharging electrodes to output the laser light and second means for operating the blower at a second lower speed and reduced blower load in a non-exposure operating state in which no laser gas is excited by the electrical discharging from said discharging electrodes for outputting the laser light.

14. (Previously Presented) An apparatus according to Claim 13, wherein said operating means further comprises means for

increasing a rotation speed of said blower in-response to a start of an exposure job in which the exposure operation is performed through said main assembly.

15. (Currently Amended) An apparatus according to Claim 14, wherein said operating means stops the rotation of said blower in the absence of the start of the exposure job.

16. (Previously Cancelled)

17. (Previously Presented) An apparatus according to Claim 15, wherein said blower has a blowing blade rotatably supported within said chamber.

18. (Previously Presented) An apparatus according to Claim 13, wherein said laser light source comprises a noble gas halide excimer laser.

19. (Previously Presented) An apparatus according to Claim 18, wherein said noble gas halide excimer laser comprises an XeCl excimer laser.

20. (Currently Amended) A gas laser operating method comprising: confining a laser gas in a chamber; exciting, using discharging electrodes, the laser gas through electrical discharge; totally reflecting laser light produced by the electrical discharging from said discharging electrodes by a total reflection mirror; reflecting the laser light by an output half-mirror and outputting a portion of the laser light reflected between said total reflection mirror and said output half-mirror spaced for resonant reflection of the laser light; recirculating, using a blower rotatable in the chamber, the laser gas within the chamber, through an electrical discharging region of the discharging electrodes; and operating-the blower at a first rotational speed responsive to the electrical discharging of the discharge electrodes in an operational state in which the laser gas is excited by the electrical discharging from

said discharge electrodes to output the laser light and operating the blower at a second lower rotational speed and reduced blower load in a stand-by state in which laser is not excited by the electrical discharging from said discharging electrodes for outputting the laser light.

21. (Previously Presented) A gas laser device according to Claim 1, wherein said laser device comprises an F2 laser.-

22. (Previously Presented) A gas laser device according to Claim 5, wherein said noble gas halide excimer laser comprises a KrF excimer laser.

23. (Previously Presented) A gas laser device according to Claim 5, wherein said noble gas halide excimer laser comprises an ArF excimer laser.

24. (Previously Presented) A gas laser device according to Claim 8, wherein said laser device comprises an F2 laser.

**25. (Previously Presented) A gas laser device according to Claim 11, wherein said noble gas halide excimer laser comprises a KrF
excimer laser.**

26. (Previously Presented) A gas laser device according to Claim 11, wherein said noble gas halide excimer laser comprises an ArF excimer laser.

27. (Previously Presented) An apparatus according to Claim 13, wherein said laser light source comprises an F2 laser.

28. (Previously Presented) An apparatus according to Claim 18, wherein said noble gas halide excimer laser comprises a KrF excimer laser.

29. (Previously Presented) An apparatus according to Claim 18, wherein said noble gas halide excimer laser comprises an ArF excimer laser.

30 - 65. (Cancelled).

66. (Currently Amended) A gas laser device, comprising: laser gas supplying means in a chamber for supplying a laser gas to an exciting region in the chamber; exciting means for exciting the laser gas supplied to the exciting region; and control means for controlling said laser gas supplying means on the basis of whether the laser gas is to be excited by said exciting means or not, wherein said supplying means operates to supply- the laser gas at a first circulating rate in response to the laser gas being excited by the exciting means and operates to supply the laser gas at a second lower circulating rate and reduced load in response to the laser gas not being excited by the exciting means.

67. (Previously Presented) A laser gas device according to Claim 66, wherein said laser gas supplying means includes a blower.

68. (Previously Presented) A laser gas device according to Claim 67, wherein said control means controls a number of revolutions of said blower.

69. (Previously Presented) A laser gas device according to Claim 66, wherein said exciting means includes two discharging electrodes disposed to sandwich said exciting region therebetween.

70. (Previously Presented) A laser gas device according to Claim 69, wherein said exciting means further includes a resonator. -

71. (Previously Presented) A laser gas device according to Claim 70, wherein said resonator comprises a pair of mirrors.

72. (Previously Presented) A laser gas device according to Claim 71, wherein said pair of mirrors includes a total reflection mirror.

73. (Currently Amended) In an exposure apparatus having a main assembly for exposing a substrate to a laser light from a laser light source the laser light source comprising: a gas laser device including (i) laser gas supplying means in a chamber for supplying a laser gas to an exciting region in the chamber, and (ii) exciting means in the exciting region for exciting the laser gas supplied to the exciting region; and control means for controlling said laser gas supplying means on the basis of whether the laser gas is to be excited by said exciting means or not wherein said supplying means operates to supply the laser gas at a first circulating rate in response to the laser gas being excited by the exciting means and operates to supply the laser gas at a second lower circulating, rate and reduced load in response to the laser gas not being excited by the exciting means.

74. (Previously Presented) An apparatus according to Claim 73, wherein said laser gas supplying means includes a blower.

75. (Previously Presented) An apparatus according to Claim 74, wherein said control means controls a number of revolutions of said blower.

76. (Previously Presented) An apparatus according to Claim 73, wherein said exciting means includes two discharging electrodes disposed to sandwich said exciting region therebetween.

77. (Previously Presented) An apparatus according to Claim 76, wherein said exciting means further includes a resonator

78. (Previously Presented) An apparatus according to Claim 77, wherein said resonator comprises a pair of mirrors.

79. (Previously Presented) An apparatus according to Claim 78, wherein said pair of mirrors includes a total reflection mirror.

80. (Currently Amended) A gas laser device comprising: a chamber for confining a laser gas therein; a discharging electrodes for exciting the laser gas through electrical discharge; a total reflection mirror for amplifying laser light produced by the electrical discharging from said discharging electrodes; an output half-mirror for amplifying the laser light and for outputting a portion of the laser light amplified between said total reflection mirror and said output half-mirror spaced for resonant reflection of the laser light; recirculating means rotatable in the chamber for recirculating the laser gas within said chamber, through an electrical discharging region of said discharging electrodes; and control means for controlling said recirculating means in an in-operation state responsive to electrical discharging -of the discharging electrodes to provide a first .gas circulation rate in which the laser as is excited by the electrical discharging from said discharging electrodes to output the laser light and controlling said recirculating means in a stand-by state to provide a second lower gas circulation rate at a reduced load in which no laser gas is excited by the electrical discharging from said discharging electrodes for outputting laser light.

81. (Currently Amended) A gas laser device according to Claim 80, wherein said control means is operable to cause gas circulation by said means to stop in the stand-by state.

82, (Previously Presented) A gas laser device according to Claim 80, wherein said recirculation means includes a blower provided within said chamber.

83. (Previously Presented) A gas laser device according to Claim 82, wherein said blower has a blower blade rotatably supported within said chamber.

84. (Previously Presented) A gas laser device according to Claim 80, wherein said gas laser device comprises one of a noble gas halide excimer laser and an F2 laser.

85. (Previously Presented) A gas laser device according to Claim 84, wherein said noble gas halide excimer laser comprises one of an XeCl excimer laser, a KrF excimer laser, and an ArF excimer laser.

86. (Currently Amended) In an exposure apparatus having a main assembly for exposing a substrate to a laser light from a laser light source, the laser light source comprising:

- (i) a chamber for confining a laser gas therein,**
- (ii) discharging electrodes for exciting the laser gas through electrical discharge,**
- (iii) a total reflection mirror for amplifying laser light produced by the electrical discharging from said discharging electrodes,**
- (iv) an output half-mirror for amplifying the laser light and for outputting a portion of the laser light amplified between said total reflection mirror and said output half-mirror spaced for resonant reflection of the laser light, and**
- (v) recirculation means rotatable in the chamber for recirculating the laser gas within said chamber, through an electrical discharging region of said discharging electrodes; and control means for controlling said recirculating means in an exposure state responsive to electrical discharging of the discharging electrodes to provide a first gas circulation rate in which the laser gas is excited by the electrical discharging from said discharging electrodes to output the laser light and controlling said recirculating means in a non-exposure state to provide a second lower gas circulation rate at a reduced load in**

which no laser gas is excited by the electrical discharging from said discharging electrodes for outputting laser light.

87. (Currently Amended) An apparatus according to Claim 86, wherein said control means is operable to increase the gas circulation rate of said recirculation means in response to a start of an exposure job in which the exposure operation is performed by the exposure apparatus.

88. (Previously Presented) An apparatus according to Claim 87, wherein said control means is operable to stop said recirculation means in the absence of start of the exposure job.

89. (Previously Presented) An apparatus according to Claim 88, wherein said recirculation means includes a blower provided within said chamber.

90. (Previously Presented) An apparatus according to Claim 89, wherein said blower has a blower blade rotatably supported within said chamber.

91. (Currently Amended) A semiconductor device manufacturing method comprising the steps of: transferring a predefined pattern onto a substrate by use of an exposure apparatus; and manufacturing a semiconductor device from the patterned substrate, wherein said exposure apparatus includes (I) a laser light source that includes

- (i) a chamber for confining a laser gas therein,**
- (ii) discharging electrodes for exciting the laser gas through electrical discharge,**
- (iii) a total reflection mirror for amplifying laser light produced by the electrical discharging from said discharging electrodes,**
- (iv) an output half-mirror for amplifying the laser light and for outputting a portion of the laser light amplified between said total reflection mirror and said output half-mirror spaced for resonant reflection of the laser light, and**

(v) recirculation means rotatable in the chamber for recirculating the laser gas within said chamber, through an electrical discharging region of said discharging electrodes;

(II) a main assembly for exposing the substrate to the laser light from said laser light source; and

(III) control means for controlling said recirculating means in an exposure state responsive to electrical discharging of the discharging electrodes to provide a first gas circulation rate in which the laser gas is excited by the electrical discharging from said discharging electrodes to output the laser light and controlling said recirculating means in a non-exposure operating state to provide a second lower gas circulation rate at a reduced load in which no laser gas is excited by the electrical discharging from said discharging electrodes for outputting laser light.

92. (Currently Amended) A semiconductor manufacturing method, comprising the i steps of a transferring a predefined pattern onto a substrate by use of an exposure apparatus; and manufacturing a semiconductor device from the patterned substrate, wherein the exposure apparatus includes (1) a gas laser device having

(i) laser gas supplying means in a chamber for supplying a laser gas to an exciting region in the chamber, and


(ii) exciting means for exciting the laser gas supplied to the exciting region; a main assembly for exposing the substrate to the laser light from said laser light source and

(II) control means for controlling said laser gas supplying means on the basis of whether the laser gas is to be excited by said exciting means or not and wherein said supplying means operates to supply the laser gas at a first circulating rate in response to the laser as being excited by the exciting means and operates to supply the laser at a second lower circulating rate, and reduced load in response to the laser gas not being excited by the exciting means."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leon Scott, Jr. whose telephone number is (571)-272-1953. The examiner can normally be reached on Monday - Friday, 6:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Don Wong can be reached at (703)308-3098. The fax phone numbers for the organization where this application or proceeding is assigned are ((703) 872-9306 for regular communications and ((703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703-306-3431).


Leon Scott, Jr.
Primary Examiner
Leon Scott, Jr.
Primary Examiner
Art Unit 2828